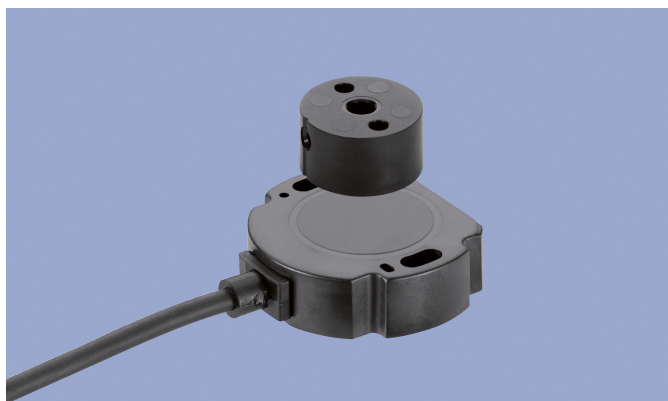
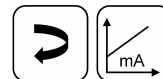


**NOVOHALL  
Rotary Sensor  
Touchless**

**RFC-4800**  
4 ... 20 mA  
**Industrial**



**Special Features**

- Touchless hall technology
- Electrical range up to 360°
- 2 part design, mechanically decoupled
- High protection class IP67, IP68, IP69
- Resolution 12 bit
- Wear-free
- Temperature range -40 °C to +105 °C
- Optimized for use in industrial applications
- Other configurations see separate data sheets

**Applications**

- Manufacturing Engineering (textile machinery, packaging machinery, sheet metal and wire machinery)
- Automation technology
- Medical Engineering

The 2 part design consisting of sensor and magnetic position marker offers great flexibility when mounting. The absence of shaft and bearing makes the assembly much less sensitive to axial and radial application tolerances - separate couplings are obsolete. Measurements can be made transmissively through any non-ferromagnetic material. The sensor is perfectly suitable for use in harsh environmental conditions through the completely encapsulated electronics.

**Description**

|                              |   |
|------------------------------|---|
| Material                     | Housing: high grade, temperature resistant plastic  |
| Mounting                     | With 2 pan head screws M4x20 (included in delivery)   |
| Fastening torque of mounting | 250 Ncm   |
| Electrical connection        | Connector M12x1, A-coded with cable L = 0.15 m / Cable 4x 0.5 mm <sup>2</sup> (AWG 20), TPE, shielded |

**Mechanical Data**

|                         |                       |
|-------------------------|-----------------------|
| Dimensions              | See dimension drawing |
| Mechanical travel       | 360° continuous       |
| Weight (w/o connection) | approx. 50 g          |

## Ordering Specifications

### Ordering Specifications

Preferred types printed in bold

- Delivery time up to 25 pcs. within 10 working days EXW
- Best low-volume pricing

Supply voltage  $U_b$

1:  $U_b = 24$  VDC

Output signal

2: 4 ... 20 mA

Output characteristic

1: **Rising output characteristic cw**

2: Rising output characteristic ccw

Other output characteristics on request

Electrical connection

201: Cable, 4-pole, shielded, L = 0.5 m

**202: Cable, 4-pole, shielded, L = 1 m**

**206: Cable, 4-pole, shielded, L = 3 m**

210: Cable, 4-pole, shielded, L = 5 m

220: Cable, 4-pole, shielded, L = 10 m

**501: Connector M12x1, 4-pin, with cable, shielded, L = 0.15 m**

Cable versions and assembled connectors on request

**R F C - 4 8 5 1 - 6 3 6 - 1 2 1 - 2 0 2**

Series

Mechanical version

**4851: Elongated hole mounting for easy adjustment**

4852: Round hole mounting

**4853: Elongated hole mounting, without diagnostic function**

4854: Round hole mounting, without diagnostic function

Other configurations e.g. with internal shielding against magnetic fields on request

Measuring range

03: Angle 0° ... 30° min.

...

**06, 12, 18, 24, 36**

...

36: Angle 0° ... 360° max.

Other angles on request

Number of channels

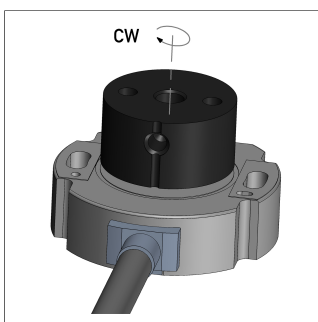
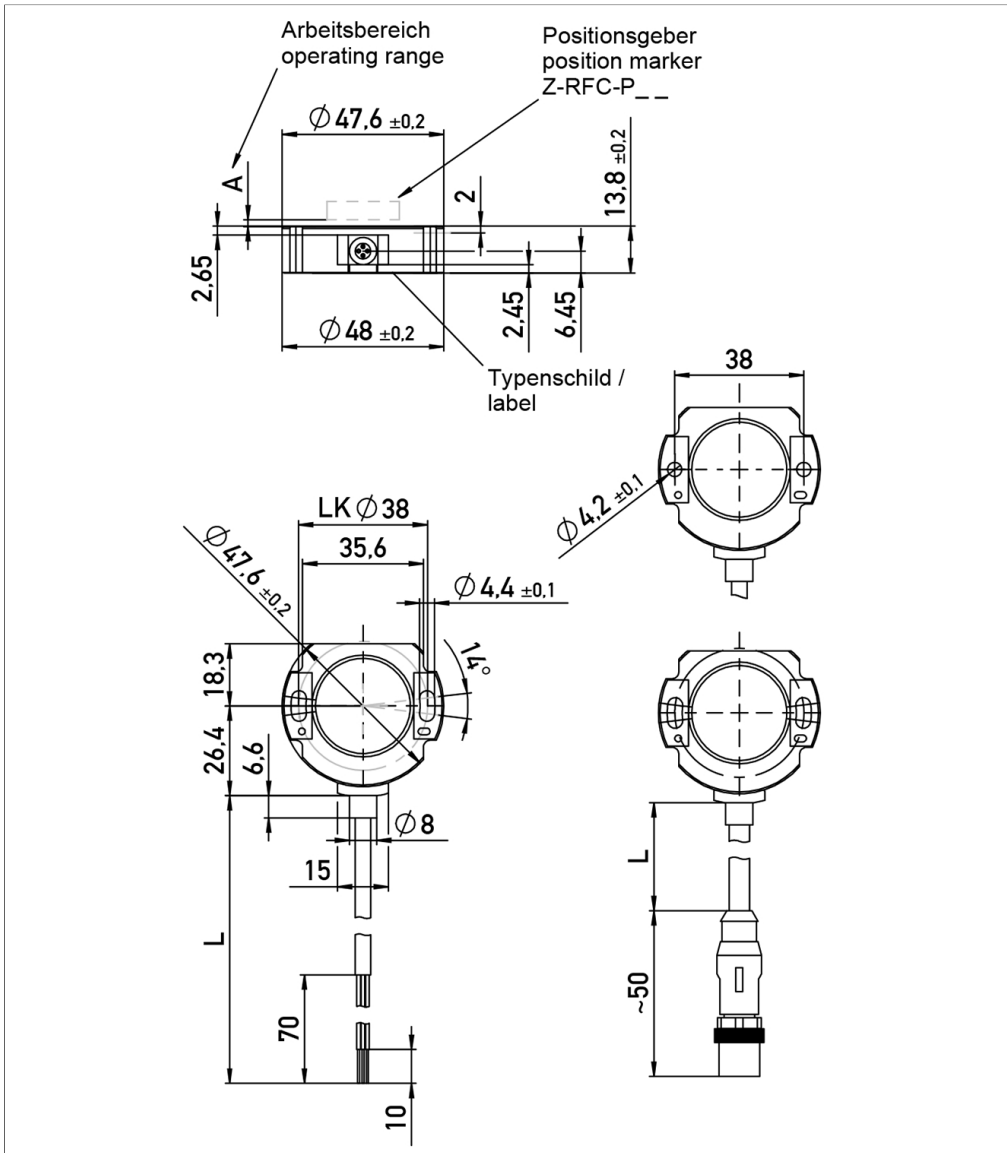
**6: One-channel version (1x supply voltage  $U_b$  / 1x output)**

### Accessories included in delivery

- 2x Pan head screws M4x20

**Drawing**

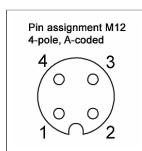
CAD data see  
[www.novotechnik.de/en/download/cad-data/](http://www.novotechnik.de/en/download/cad-data/)



When the marking of the position marker is pointing towards the cable, the sensor output is near the electrical center position.

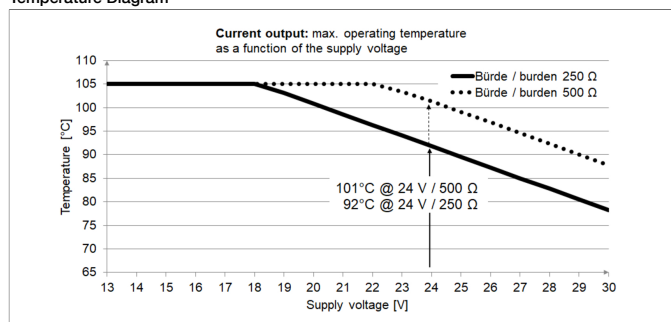
## Technical Data

| Type  | RFC-48 _ _ _ _ -12 _ _ _ _   |                    |
|---|--|--------------------|
| Analog current                              |  |                    |
| Output signal                               | 4 ... 20 mA  |                    |
| Burden                                      | ≤ 500 Ω  |                    |
| Diagnosis                                   | activated (in case of error, output signal is outside of the plausible signal range)                   |                    |
| Update rate                                 | typ. 3.4 kHz   |                    |
| Measuring range                             | 0 ... 30° up to 0 ... 360° in 10°-steps  |                    |
| Independent linearity                       | ≤ ±0.5 %FS   |                    |
| Resolution                                  | 12 bits  |                    |
| Repeatability                               | typ. ≤ ±0.1°   |                    |
| Hysteresis                                  | typ. < ±0.1°   |                    |
|   | Only measuring range 360°: typ. < 0.25° (lower hysteresis on request)                                  |                    |
| Temperature error                           | Measuring range 30 ... 170°: typ. ±1.2 %FS, Measuring range ≥ 180°: typ. ±0.6 %FS                      |                    |
| Supply voltage Ub                           | 24 VDC (13 ... 30 VDC)   |                    |
| Current consumption w/o load                | typ. 12 mA per channel   |                    |
| Polarity protection                         | yes (supply lines and outputs)   |                    |
| Short circuit protection                    | yes (vs. GND and supply voltage Ub)  |                    |
| Insulation resistance (500 VDC)             | ≥ 10 MΩ  |                    |
| <b>Environmental Data</b>                   |  |                    |
| Max. operational speed                      | Mechanically unlimited   |                    |
| Vibration IEC 60068-2-6                     | 20 g, 5 ... 2000 Hz, Amax = 0.75 mm  |                    |
| Shock IEC 60068-2-27                        | 50 g, 6 ms   |                    |
| Protection class DIN EN 60529               | IP67 (connector M12), IP67 / IP68 / IP69   |                    |
| Operating temperature                       | -25 ... +85°C (connector M12), -40 ... +105°C*   |                    |
|   | * The max. operating temperature depends on supply voltage Ub and load resp. burden (see temp.diagram) |                    |
| Life  | Mechanically unlimited   |                    |
| Functional safety                           | If you need assistance in using our products in safety-related systems, please contact us              |                    |
| MTTF (IEC 60050)                            | 798 years  |                    |
| Traceability                                | Serial number on type labeling: production batch of the sensor assembly and relevant sensor components |                    |
| <b>EMC Compatibility</b>                    |  |                    |
| EN 61000-4-2 ESD (contact/air discharge)    | 4 kV, 8 kV   |                    |
| EN 61000-4-3 Electromagnetic fields (RFI)   | 10 V/m   |                    |
| EN 61000-4-4 Fast transients (burst)        | 1 kV   |                    |
| EN 61000-4-6 Cond. disturbances (HF fields) | 10 V eff.  |                    |
| EN 55016-2-3 Radiated disturbances          | Industrial and residential area  |                    |
| <b>Connection Assignment</b>                |  |                    |
| Signal                                      | Connector<br>code 5_ _   | Cable<br>code 2_ _ |
| Supply voltage Ub                           | Pin 1  | GN                 |
| GND   | Pin 3  | BN                 |
| Signal output                               | Pin 2  | WH                 |
| Not assigned                                | Pin 4  | YE                 |
| Connect cable shielding to GND              |  |                    |

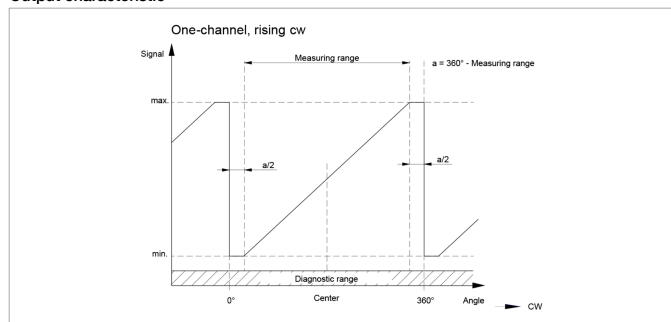


**Technical Data  
Output  
Characteristics**

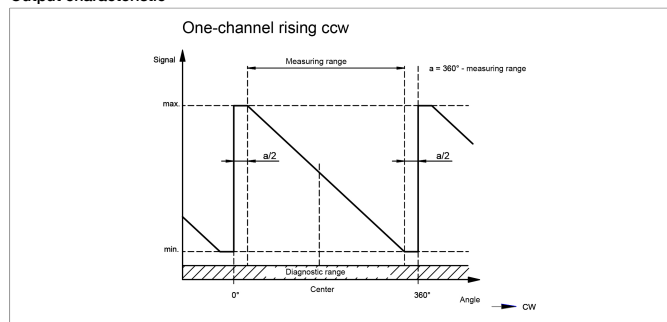
**Temperature Diagram**



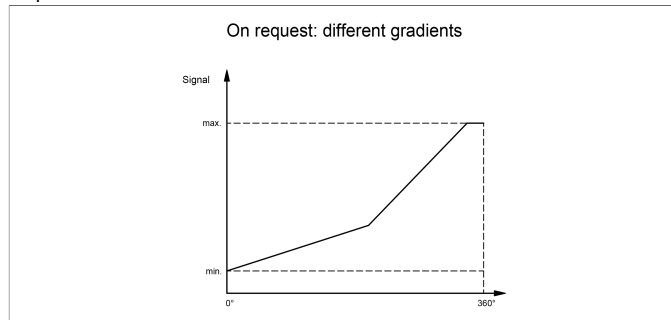
**Output characteristic**



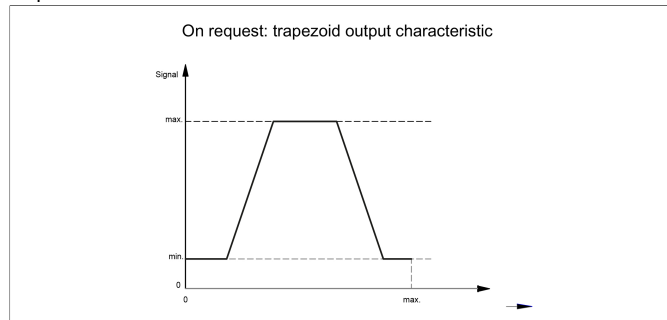
**Output characteristic**



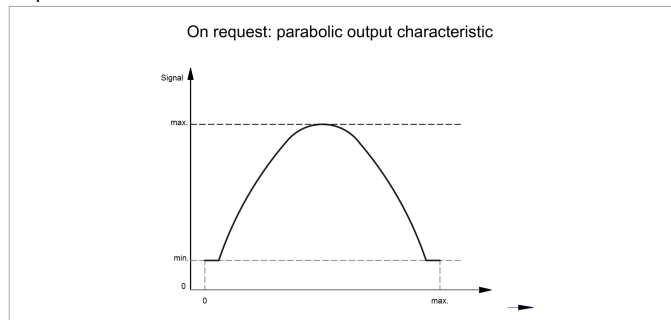
**Output characteristic**



**Output characteristic**



**Output characteristic**



## Position Markers

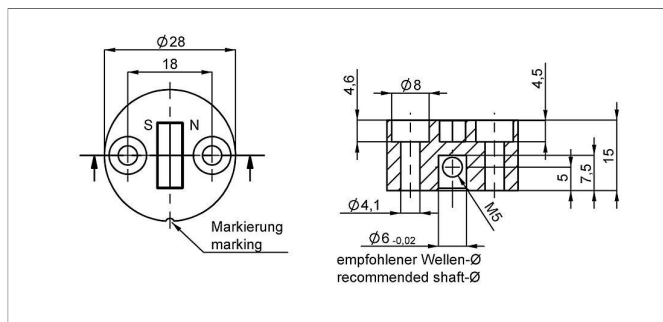


### Z-RFC-P02

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with locking pin (both included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 40005661  | 1                |
| 400056080 | 25               |

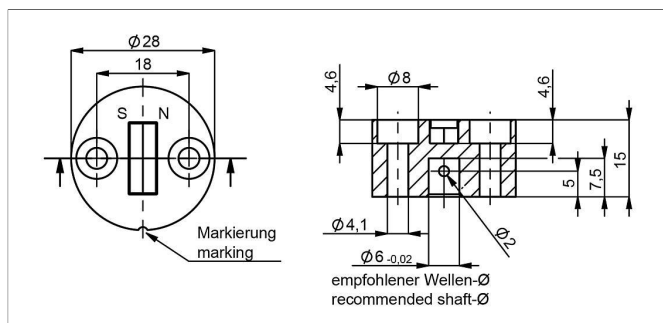


### Z-RFC-P08

Position marker for fixation with threaded pin M5 (included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400056070 | 1                |
| 400056084 | 25               |

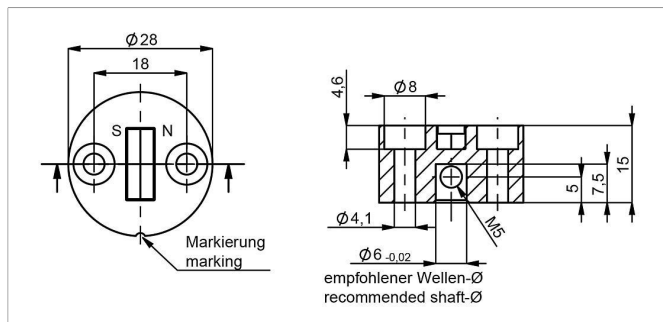


### Z-RFC-P41

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with locking pin (both included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400105037 | 1                |
| 400105038 | 25               |



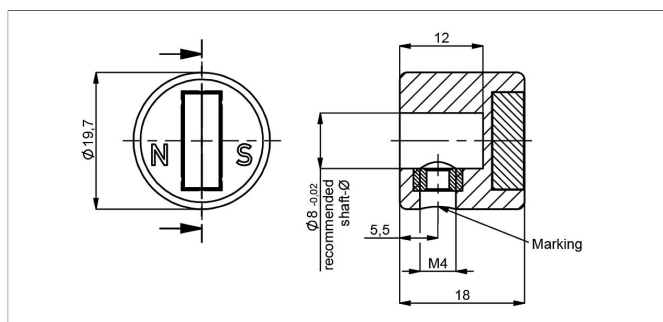
### Z-RFC-P47

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with threaded pin M5 (both included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400105039 | 1                |
| 400105040 | 25               |

## Position Markers



### Z-RFC-P23

Position marker for fixation with threaded pin M4 (included in delivery)

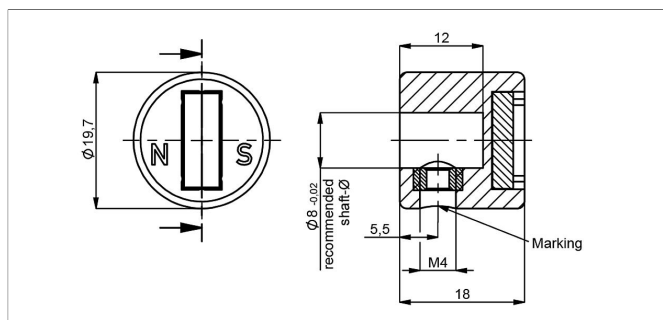
Caution: For orientation of the output characteristic please follow the user manual of the position marker!

Material PA6-GF

Max. permitted  $\pm 3$  mm

radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400056074 | 1                |
| 400056085 | 25               |



### Z-RFC-P43

Position marker for fixation with threaded pin M4 (included in delivery)

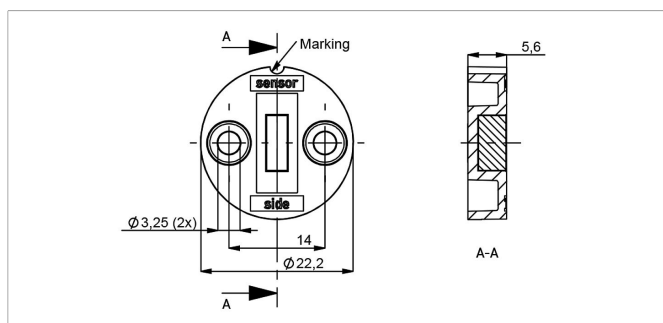
Caution: For orientation of the output characteristic please follow the user manual of the position marker!

Material PA6-GF

Max. permitted  $\pm 3$  mm

radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400105041 | 1                |
| 400105042 | 25               |



### Z-RFC-P30

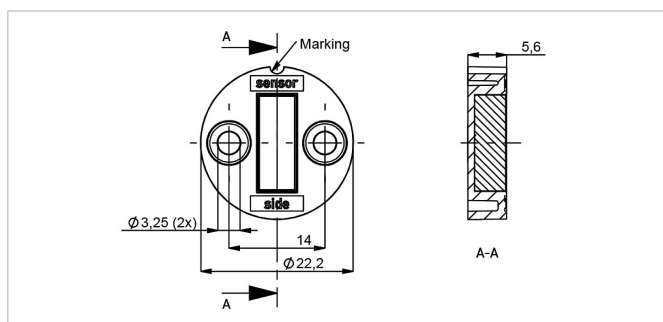
Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).

Material PBT-GF

Max. permitted  $\pm 1.5$  mm

radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400056086 | 1                |
| 400056087 | 25               |



### Z-RFC-P31

Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).

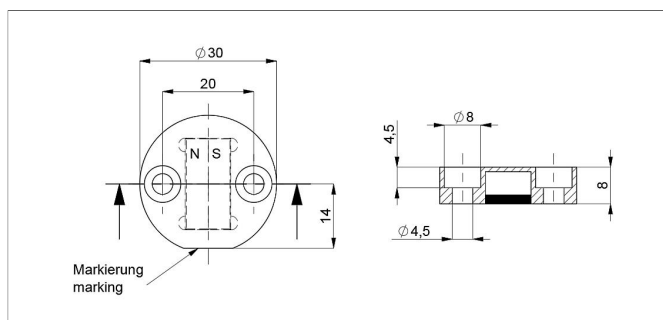
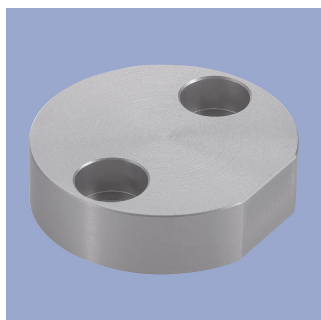
Material PBT-GF

Max. permitted  $\pm 3$  mm

radial offset

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400056088 | 1                |
| 400056089 | 25               |

## Position Markers



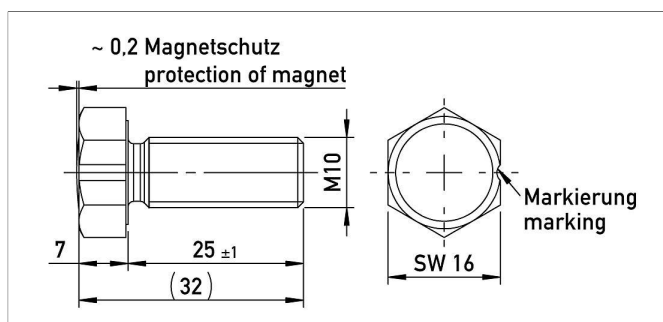
### Z-RFC-P22

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation, included in delivery).

Attention: Closed side of position marker faces the active side of sensor.

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 4$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400106735 | 1                |
| 400106736 | 25               |

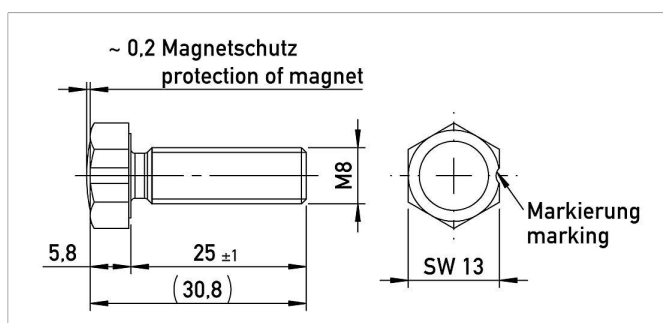


### Z-RFC-P18

Screw position marker M10 x 25 mm, similar DIN 933, magnet potted

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 3$  mm

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400104756 | 1                |
| 400104757 | 25               |

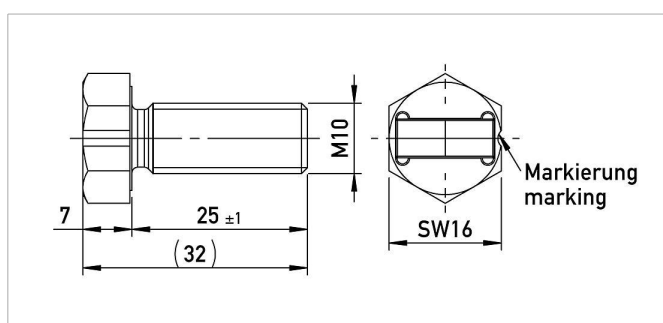


### Z-RFC-P19

Screw position marker M8 x 25 mm, similar DIN 933/ISO 4017, magnet potted

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 1.5$  mm

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400104754 | 1                |
| 400104755 | 25               |



### Z-RFC-P20

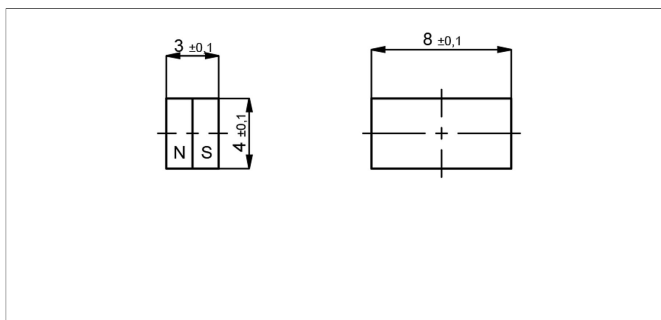
Screw position marker M10 x 25 mm, similar DIN 933

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 3$  mm

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 400104758 | 1                |
| 400104759 | 25               |



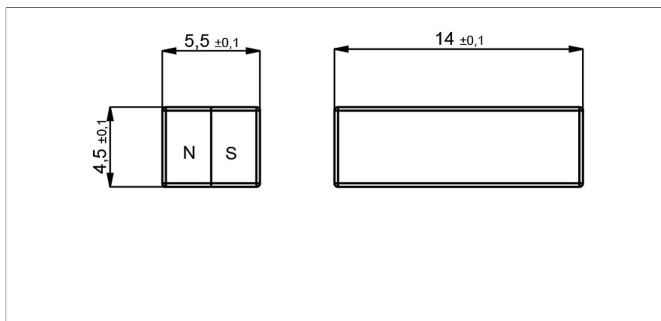
## Position Markers



### Z-RFC-P03

Magnet for direct application onto customer's shaft (see user manual).  
We recommend mounting on non-magnetizable materials, otherwise the specified working distances will vary (e.g. reduction of approx. 20% with axial mounting on a magnetizable shaft).  
Max. permitted radial offset  $\pm 1.5$  mm

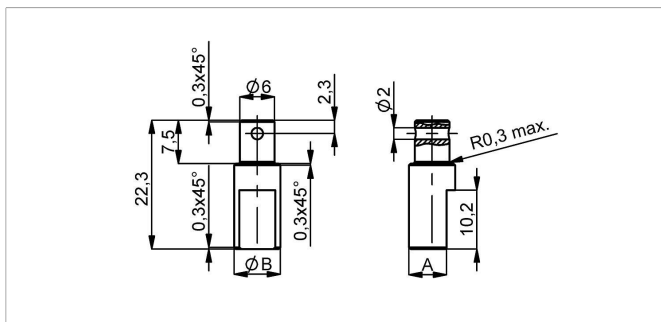
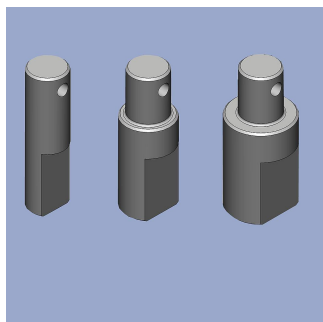
| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 40005658  | 1                |
| 400056081 | 50               |



### Z-RFC-P04

Magnet for direct application onto customer's shaft (see user manual).  
We recommend mounting on non-magnetizable materials, otherwise the specified working distances will vary (e.g. reduction of approx. 20% with axial mounting on a magnetizable shaft).  
Max. permitted radial offset  $\pm 3$  mm

| P/N       | Pack. unit [pcs] |
|-----------|------------------|
| 40005659  | 1                |
| 400056082 | 50               |



### Z-RFC-S01/S02/S03

Shaft adapter for fixation at position marker Z-RFC-P02/P41 with locking pin

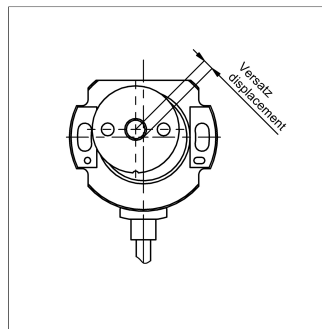
| P/N       | Type      | ØB / A [mm] |
|-----------|-----------|-------------|
| 400056206 | Z-RFC-S01 | 6 / 4.5     |
| 400056207 | Z-RFC-S02 | 8 / 6.5     |
| 400056208 | Z-RFC-S03 | 10 / 8.5    |

## Position Markers

### Working Distances Position Markers [mm] - One-channel Versions

|                            | Z-RFC-P02 / P04 / P08<br>Z-RFC-P20 / P23 / P31 | Z-RFC-P41 / P43 / P47 | Z-RFC-P03 / P30 | Z-RFC-P18 | Z-RFC-P19 | Z-RFC-P22   |
|----------------------------|--|-----------------------|-----------------|-----------|-----------|-------------|
| RFC-4851                   | 2.3 ... 5                                      | 0 ... 2.7             | 0.7 ... 2.2     | 0 ... 4.5 | 0 ... 2.2 | 4.4 ... 9.2 |
| RFC-4852<br>with diagnosis |  |                       |                 |           |           |             |
| RFC-4853                   | 0 ... 4  | 0 ... 2.7             | 0 ... 1.5       | 0 ... 4.5 | 0 ... 2.2 | 4.4 ... 9.2 |
| RFC-4854<br>w/o diagnosis  |  |                       |                 |           |           |             |

### Lateral Magnet Offset

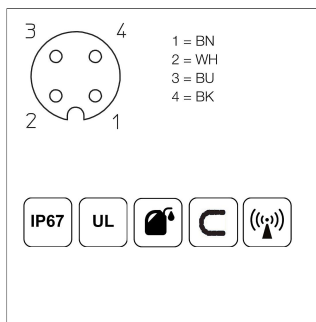
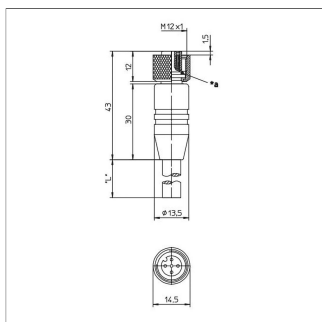
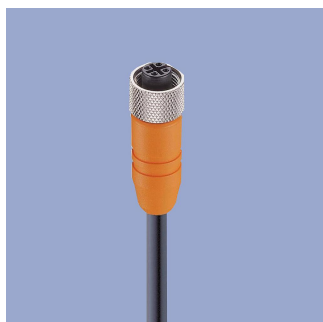


Lateral magnet offset will cause additional linearity error. The angle error, which is caused by radial displacement of sensor and position marker depends on the used position marker or magnet.

### Additional Linearity Error at Radial Displacement - One-channel Versions

| Z-RFC-P02 / P04 / P08<br>Z-RFC-P20 / P23 / P31 | Z-RFC-P41 / P43 / P47   | Z-RFC-P03 / P30         | Z-RFC-P18               | Z-RFC-P19               | Z-RFC-P22               |
|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 0.5 mm: $\pm 0.4^\circ$                        | 0.5 mm: $\pm 0.4^\circ$ | 0.5 mm: $\pm 1.4^\circ$ | 0.5 mm: $\pm 0.7^\circ$ | 0.5 mm: $\pm 1.3^\circ$ | 1.0 mm: $\pm 0.8^\circ$ |
| 1.0 mm: $\pm 1.1^\circ$                        | 1.0 mm: $\pm 1.1^\circ$ | 1.0 mm: $\pm 3.7^\circ$ | 1.0 mm: $\pm 1.3^\circ$ | 1.0 mm: $\pm 2.6^\circ$ | 2.0 mm: $\pm 1.8^\circ$ |
| 2.0 mm: $\pm 3.5^\circ$                        | 2.0 mm: $\pm 3.5^\circ$ | 2.0 mm: -               | 2.0 mm: $\pm 3.3^\circ$ | 2.0 mm: -               | 4.0 mm: $\pm 5.4^\circ$ |

## Connector System M12



**EEM-33-32/62/97**  
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

Plug housing PA  
Cable sheath PUR, Ø = max. 6 mm, -25 ... +80°C (moved), -50 ... +80°C (fixed)

Lead wires PP, 0.34 mm<sup>2</sup>

| P/N       | Type      | Length |
|-----------|-----------|--------|
| 400005600 | EEM-33-32 | 2 m    |
| 400005609 | EEM-33-62 | 5 m    |
| 400005650 | EEM-33-97 | 10 m   |

**IP67** Protection class IP67 DIN EN 60529

**IP68** Protection class IP68 DIN EN 60529

**EMC** Very good Electromagnetic Compatibility (EMC) and shield systems

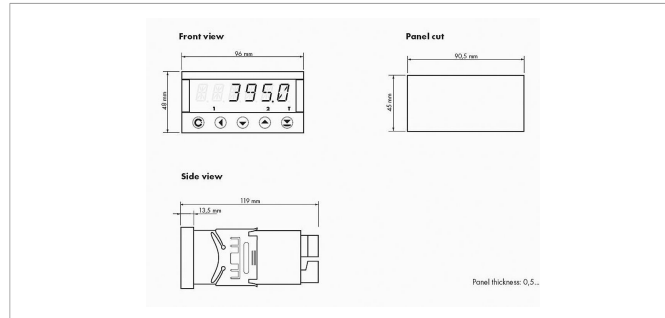
**UL** Very good resistance to oils, coolants and lubricants

**C** Suited for applications in dragchains

**UL** UL - approved

**CAN** CAN-Bus

## Signal Processing



### MAP-4000

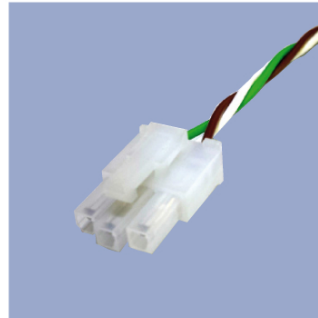
Multifunctional measuring device with digital display for direct connection of potentiometric and normalized signals.

- Supply voltage 10...30 VDC, 80...250 VDC or AC
- High accuracy up to 0.1%
- Adjustable supply voltage for sensors 5...24 V
- Temperature coefficient 100 ppm/K
- Optional RS 232, RS 485, analog output, limited switch
- Complete data see separate data sheet

## Connecting Options on request



- M12 connector**
- Customized lengths
  - 3-, 4-, 6- and 8-pole versions
  - Protection class IP68
  - Ordering codes of standard versions see ordering specifications



- Molex Mini Fit jr.**
- Customized length and lead wires
  - 3-, 4- and 6-pole versions
  - On request



- Tyco AMP Super Seal**
- Pin- and bushing housing
  - Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request



- Molex Mini Fit jr.**
- Customized length and lead wires
  - 3-, 4- and 6-pole versions
  - On request



- Deutsch DTM 04**
- Pin- and bushing housing
  - Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request



- ITT Cannon Sure Seal connector**
- Customized lengths
  - 3-, 4- and 6-pole versions
  - Protection class IP67
  - On request

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Fax +49 711 4489-118  
info@novotechnik.de  
www.novotechnik.de



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The specifications contained in our datasheets are intended solely for informational purposes. The documented specification values are based on ideal operational and environmental conditions and can vary significantly depending on the actual customer application. Using our products at or close to one or more of the specified performance ranges can lead to limitations regarding other performance parameters. It is therefore necessary that the end user verifies relevant performance parameters in the intended application. We reserve the right to change product specifications without notice.